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## Blowfly strike in sheep: self-help surveillance for shepherds is unsustainable

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Abstract:	<p>Flystrike in sheep, mostly caused by <i>Lucilia sericata</i> (Diptera: Calliphoridae) has been consistently identified as one of the most important sheep diseases, from both a financial and welfare perspective (Bennett and others, 1999; Bennett, 2003; Bennett and Ijpelaar, 2005; Boyne and others, 2006). Infestation levels vary greatly depending on a wide range of factors related to the composition of the parasite fauna, the host, animal husbandry and control practices, climate and geography. However, it has been predicted that the season for flystrike will change (Wall and others, 2011), which, anecdotally, appears to be the case (Anon., 2012). Variation in the occurrence of flystrike in sheep, from year to year and area to area (Bisdorff and others, 2006), means that traditional preventative programmes are often not as effective as they used to be. A report in 2013, commissioned by the pharmaceutical industry (Wall and others, 2013) identified three key issues experienced by farmers: unpredictable weather patterns that make the timing of blowfly treatment difficult; increased risk of treatment resistance and the problem of treating parasites too late in the season. Early use of appropriate compounds for the prevention of flystrike aids effective control (Walters and Wall, 2012). With the aim to help farmers tailor their flystrike control programmes a simple website was developed (<a href="http://www.flystrikealert.co.uk/">http://www.flystrikealert.co.uk/</a>). The objective was for British farmers to be able to anonymously report when they encountered cases of flystrike in their flock.</p>

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Title: Blowfly strike in sheep: self-help surveillance for shepherds is unsustainable

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## Abstract

Flystrike in sheep is a welfare issue with economic consequences. Changes in patterns of occurrence are challenging the effective prevention of this condition by flock-owners. A web-based surveillance tool was developed for the anonymized real-time reporting and mapping of cases. It generated some interest but the 'tipping-point' where sufficient reports are received to generate a viable, useful, tool was not achieved. This was consistent with opinions expressed in a small, potentially biased, survey on the attitudes and intentions of flock-owners, if presented with such a tool. Other methods for ovine endemic disease surveillance will need to be explored.

Short communication

Flystrike in sheep, mostly caused by *Lucilia sericata* (Diptera: Calliphoridae) has been consistently identified as one of the most important sheep diseases, from both a financial and welfare perspective (Bennett and others, 1999; Bennett, 2003; Bennett and Ijpelaar, 2005; Boyne and others, 2006). Infestation levels vary greatly depending on a wide range of factors related to the composition of the parasite fauna, the host, animal husbandry and control practices, climate and geography. However, it has been predicted that the season for flystrike will change (Wall and others, 2011), which, anecdotally, appears to be the case (Anon., 2012). Variation in the occurrence of flystrike in sheep, from year to year and area to area (Bisdorff and others, 2006), means that traditional preventative programmes are often not as effective as they used to be. A report in 2013, commissioned by the pharmaceutical industry (Wall and others, 2013) identified three key issues experienced by farmers: unpredictable weather patterns that make the timing of blowfly treatment difficult; increased risk of treatment resistance and the problem of treating parasites too late in the season. Early use of appropriate compounds for the prevention of flystrike aids effective control (Walters and Wall, 2012). With the aim to help farmers tailor their flystrike control programmes a simple website was developed (<http://www.flystrikealert.co.uk/>). The objective was for British farmers to be able to anonymously report when they encountered cases of flystrike in their flock.

The basic details to be submitted are: date of detection; location to postcode district level (first four characters); age group (lamb i.e < 1 year lamb; mature sheep > 1 year) and severity level (minor <25% of flock; major > 25% flock). To avoid spurious usage, the CPH (County, Parish, Holding) number has to be entered for a record to be validated, although this information is not retained. The GPS location data is mapped online using Google maps API (<https://developers.google.com/maps/web/>) and can be viewed on the same website. The maps of reports can be filtered by date. The intention was that such self-reporting by shepherds could be used, in conjunction with parasite forecasts (Anon., 2016) and would help to inform others of when there was a problem in their area, facilitating treatment decisions and, eventually, to provide year-on-year information. However, the success of this potential tool for surveillance of an endemic health and welfare problem would depend entirely on the willingness of the industry to participate. If it became viable then additional functionality could be added. The website was launched with accompanying press and industry releases in May 2013 (Anon. 2013 a & b, Alderton 2013). It was later publicised by the authors at numerous farmers meetings across the country and at other research-to-industry interface events.

Since launch, to April 2016, a total of 40 records have been entered. The majority of these were in 2013 (n=35), with 13 being for lambs and 20 for mature sheep. Detection dates for lambs ranged from the third week in May to the first week in October and from the second week in May to the last week of July for mature sheep. Two records had a detection date of the 1<sup>st</sup> January 2013. It is known that early season strike in ewes is reduced after shearing and that is reflected here. The records in 2014 and 2015 (two and three, respectively) were for mature sheep with the 2014 cases being detected in June and the 2015 cases from the second week in April to the second week in July. Most records came from England (south of the Peak District), with some

from south, south east Wales, plus two from Scotland (in 2013 & 2015). All but one of the records (a mature sheep report in early June 2013) were minor in nature.

The response to the provision of this self-help surveillance tool for flystrike for shepherds was not entirely unexpected. In 2012, one of the authors (Tongue) led a small qualitative survey in which a convenience sample of Scottish sheep farmers from across Scotland were interviewed to investigate farmers' and veterinarians' perceptions of their role in monitoring sheep health and their attitudes towards surveillance for animal disease. One question asked about a specific example: web-based mapping of the occurrence of flystrike cases that would rely on sheep farmers entering details of the location and timing of cases to produce a map of the approximate geographical location of cases. Almost two thirds (65%; n=13) said they would not be interested in visiting a website to see the approximate geographical location of recently reported flystrike cases in sheep. The main reasons given for their lack of interest were: they had never had a strike problem; they could judge themselves when there is going to be a problem on their farm, or they had a prevention plan in place that worked. However, approximately half said that they would, in principle, be prepared to report cases. Barriers to reporting included time and technological issues (such as reluctance to use a computer), a perceived lack of utility, and accessibility of their information to the general public. Where possible, these barriers were considered when developing this website. The sheep farmers interviewed were not a random sample; they were identified by selected vets in five areas across Scotland. This could have introduced bias; however, one might hypothesise that these would be sheep farmers that are, at least, interested in the treatment and prevention of disease. This may have contributed to the apparent satisfaction with current measures taken to deal with flystrike. In addition, only two flocks were classified as Lowland flocks with the majority of the rest designating themselves as Upland (one Hill/Upland; one not stated). Thus, they may not have been representative of the types of flocks that routinely experience problems with flystrike.

Any system that relies on voluntary reporting will always provide an under-estimate of the occurrence of the events reported. In order to make a self-reporting tool such as this website work, and ensure that it provides useful feedback and information for those that might seek it, engagement is required from a substantial proportion of the potentially affected population. This was not achieved, despite the perceived importance of this disease to the health and welfare of the national sheep flock. This limited uptake is a disappointment, given the independence of this website from any commercial interest. It is possible that wider and repeated promotion may enhance uptake to the tipping point where such a self-help tool becomes self-sustaining; it may not. Other barriers and constraints may contribute to the lack of engagement. Some of these may relate to the hardware, some to the software and some to the population of interest. Jespersen and others (2013) identified six overarching barriers to the use of information and communication technology (ICT) in agriculture. These were: limited use of social media for innovation in the agricultural sector; insufficient internet connections; lack of access to hardware tools; cultural barriers and lack of engagement in the use of social media; overload of farmers with information and mis-information and the lack of long-term solutions beyond the research project period. Insufficient mobile phone and internet connection is a major problem in rural areas of the United Kingdom (UK), as evidenced by the low score for UK farms, in terms of both internet access and handheld phones (Holster and others, 2012). Although the UK scores

relatively highly for internet speed and access within the European Union (ITU, 2011), these values will be skewed by urban densities, whereas sheep producers are located in the more remote areas (AHDB Beef and Lamb, 2016; Scottish Government, 2016). This has been highlighted as an issue for some time; one that has led to a “digital divide” between the relatively extensive, smaller, more rurally based cattle and sheep producers and the larger-scale intensive arable and dairy sectors (Warren, 2002 & 2004). Cultural barriers may include the older age of the average farmer (Matthews, 2012; Sharma and others, 2011) at 59 years old (Defra, 2015), decision-making styles (Jørgenson and others, 2007), and preferences for more traditional methods of information provision (Kaler & Green, 2013). However, perhaps one of the most pertinent factors may be the view that sheep farmers hold: the view that sheep farming is complex; they are the experts with unique understanding and insights - particularly into the management of their own flock - to which any outsider can make only a limited contribution (Kaler & Green, 2013). This view would limit their engagement with co-operative technologies such as this website.

Further research into potential barriers and how to overcome them, additional long-term support with adaptation of the tool in response to user requirements (Douthwaite and others, 2001) and/or further promotion would all require additional resources to be made available. While Ballantyne and others (2010) felt that researchers could benefit from sourcing data from farmers through mobile ICT, there is little appetite for the provision of funding for endemic disease surveillance and little benefit, in terms of Research Excellence Framework output, from the academic stand point. It may be that the necessary resource input is only economically viable for those who can benefit directly e.g. through increased product sales. If this is the case then it is no longer purely a self-help surveillance tool for the industry. Alternatively, with technological advances, improvements in infrastructure, a change in the demographics of the farming population, further shifts towards digital approaches and increasing awareness of the value of citizen science, the possibility of achieving a positive outcome may improve. However, at this point in time, other methods will need to be explored for the surveillance of ovine endemic diseases.

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